IN THE CLAIMS:

1. (Currently Amended) A method of analyzing flutter test data, the method comprising:

reading a plurality of data sets, each data set including a plurality of data points recorded by a corresponding measurement device, each data point representing an amplitude versus a test time;

determining a number "N" of damped sine waves to fit to each of the data sets ~~the plurality~~ of data points; ~~and~~

simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~; and

determining a set of modal frequency and damping values based on the simultaneous fitting of all of the data sets.

2. (Currently Amended) The method of Claim 1, wherein simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~ includes simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~ using a non-linear "N" damped sine wave fitting algorithm.

3. (Currently Amended) The method of Claim 1, wherein determining a number "N" of damped sine waves to fit to each of the data sets ~~the plurality of data points~~ includes comparing a magnitude of a time history response for a sine wave mode to a total transducer response.

4. (Currently Amended) The method of Claim 1, wherein determining a number "N" of damped sine waves to fit to each of the data sets ~~the plurality of data points~~ includes:

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Seattle, Washington 98104
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determining a fit error between a candidate sine wave mode and the plurality of data points; and

comparing a magnitude of a time history response for the candidate sine wave mode to the fit error.

5. (Currently Amended) The method of Claim 1, wherein fitting the number "N" of damped sine waves to each of the data sets ~~the plurality of data points~~ includes:

determining a fit error between a sine wave mode and the plurality of data points; and

applying a Fast-Fourier Transform function to the fit error to estimate a next sine wave mode to be included in the non-linear "N" damped sine wave fitting algorithm.

6. (Currently Amended) The method of Claim 1, wherein fitting the number "N" of damped sine waves to each of the data sets ~~the plurality of data points~~ includes:

assessing a significance of a sine wave mode; and

determining whether to include the sine wave mode in the non-linear "N" damped sine wave fitting algorithm based on the assessment.

7. (Original) The method of Claim 6, wherein assessing a significance of a sine wave mode includes determining an amplitude factor for the sine wave mode.

8. (Original) The method of Claim 6, wherein assessing a significance of a sine wave mode includes determining an amplitude factor for the sine wave mode, the amplitude factor being a function of a ratio of an amplitude over an amplitude range of the sine wave mode.

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9. (Original) The method of Claim 8, wherein assessing a significance of a sine wave mode further includes determining the sine wave mode to be insignificant when the amplitude factor is less than or approximately equal to an average error value.

10. (Original) The method of Claim 8, wherein assessing a significance of a sine wave mode further includes determining the sine wave mode to be insignificant when the amplitude factor is less than or approximately equal to a square root of an average error value squared.

11. (Currently Amended) The method of Claim 1, wherein reading a plurality of data sets ~~a plurality of data points~~ includes selecting the plurality of data sets based on whether the data set can be modeled as a series of damped sine waves

~~reading a first plurality of data points corresponding to a first test sensor; and~~

~~reading a second plurality of data points corresponding to a second test sensor~~.

12. (Currently Amended) A method of analyzing flutter test data, the method comprising:

reading a plurality of sets of data points obtained from a plurality of test sensors, each set of data points representing an amplitude versus a test time for a corresponding one of the plurality of test sensors;

determining which of the plurality of sets of data points are useful sets of data points;

for the useful sets of data points, performing a curve fit to each of the data sets that includes determining a number "N" of damped sine waves to fit to the useful sets of data points; ~~and~~

simultaneously fitting the number "N" of damped sine waves to the useful sets of data sets ~~points~~; and

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determining a set of modal frequency and damping values based on the simultaneous fitting of the useful data sets.

13. (Currently Amended) The method of Claim 12, wherein simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~ includes simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~ using a non-linear "N" damped sine wave fitting algorithm.

14. (Currently Amended) The method of Claim 12, wherein simultaneously determining a number "N" of damped sine waves to fit to the useful sets of data sets ~~points~~ includes simultaneously comparing a magnitude of a time history response for a sine wave mode to a total transducer response.

15. (Currently Amended) The method of Claim 12, wherein simultaneously determining a number "N" of damped sine waves to fit to the useful sets of data sets ~~points~~ includes:

determining a fit error between a candidate sine wave mode and the useful sets of data points; and

comparing a magnitude of a time history response for the candidate sine wave mode to the fit error.

16. (Currently Amended) The method of Claim 12, wherein simultaneously fitting the number "N" of damped sine waves to the useful sets of data sets ~~points~~ includes:

determining a fit error between a sine wave mode and the useful sets of data points; and

applying a Fast-Fourier Transform function to the fit error to estimate a next sine wave mode to be included in the non-linear "N" damped sine wave fitting algorithm.

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17. (Currently Amended) The method of Claim 12, wherein simultaneously fitting the number "N" of damped sine waves to the useful sets of data sets ~~points~~ includes:

assessing a significance of a sine wave mode; and

determining whether to include the sine wave mode in the non-linear "N" damped sine wave fitting algorithm based on the assessment.

18. (Original) The method of Claim 17, wherein assessing a significance of a sine wave mode includes determining an amplitude factor for the sine wave mode.

19. (Original) The method of Claim 17, wherein assessing a significance of a sine wave mode includes determining an amplitude factor for the sine wave mode, the amplitude factor being a function of a ratio of an amplitude over an amplitude range of the sine wave mode.

20. (Original) The method of Claim 19, wherein assessing a significance of a sine wave mode further includes determining the sine wave mode to be insignificant when the amplitude factor is less than or approximately equal to an average error value.

21. (Original) The method of Claim 19, wherein assessing a significance of a sine wave mode further includes determining the sine wave mode to be insignificant when the amplitude factor is less than or approximately equal to a square root of an average error value squared.

22. (Currently Amended) The method of Claim 12, wherein simultaneously fitting the number "N" of damped sine waves to the useful sets of data sets ~~points~~ includes:

determining an error value for each useful data set; and

scaling the useful data set to evenly weight the fit for each useful data set.

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23. (Currently Amended) A machine-readable medium having instructions stored thereon for execution by a processor to perform a method of of analyzing flutter test data, the method comprising:

reading a plurality of data sets, each data set including a plurality of data points, each data point representing an amplitude versus a test time;

determining a number "N" of damped sine waves to fit to the plurality of data sets ~~points~~; ~~and~~

simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~; and

determining a set of modal frequency and damping values based on all of the data sets.

24. (Currently Amended) The medium of Claim 23, wherein simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~ includes simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~ using a non-linear "N" damped sine wave fitting algorithm.

25. (Currently Amended) The medium of Claim 23, wherein simultaneously determining a number "N" of damped sine waves to fit to the plurality of data sets ~~points~~ includes comparing a magnitude of a time history response for a sine wave mode to a total transducer response.

26. (Currently Amended) The medium of Claim 23, wherein simultaneously determining a number "N" of damped sine waves to fit to the plurality of data sets ~~points~~ includes:

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determining a fit error between a candidate sine wave mode and the plurality of data sets ~~points~~; and

comparing a magnitude of a time history response for the candidate sine wave mode to the fit error.

27. (Currently Amended) The medium of Claim 23, wherein simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~ includes:

determining a fit error between a sine wave mode and the plurality of data points; and

applying a Fast-Fourier Transform function to the fit error to estimate a next sine wave mode to be included in the non-linear "N" damped sine wave fitting algorithm.

28. (Currently Amended) The medium of Claim 23, wherein simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~ includes:

assessing a significance of a sine wave mode; and

determining whether to include the sine wave mode in the non-linear "N" damped sine wave fitting algorithm based on the assessment.

29. (Original) The medium of Claim 28, wherein assessing a significance of a sine wave mode includes determining an amplitude factor for the sine wave mode.

30. (Original) The medium of Claim 28, wherein assessing a significance of a sine wave mode includes determining an amplitude factor for the sine wave mode, the amplitude factor being a function of a ratio of an amplitude over an amplitude range of the sine wave mode.

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31. (Original) The medium of Claim 30, wherein assessing a significance of a sine wave mode further includes determining the sine wave mode to be insignificant when the amplitude factor is less than or approximately equal to an average error value.

32. (Original) The medium of Claim 30, wherein assessing a significance of a sine wave mode further includes determining the sine wave mode to be insignificant when the amplitude factor is less than or approximately equal to a square root of an average error value squared.

33. (Currently Amended) The medium of Claim 23, wherein reading a plurality of data sets, each data set including a plurality of data points includes:

reading a first plurality of data points corresponding to a first test sensor; and

reading a second plurality of data points corresponding to a second test sensor.

34. (Currently Amended) A system for analyzing flutter test data, comprising:

a control component;

a computer operatively coupled to the control component and adapted to receive a plurality of data sets, each data set including a plurality of test data points, the computer further being adapted to perform a method of analyzing the plurality of test data points, the method including:

determining a number "N" of damped sine waves to fit to each of the data sets ~~the plurality of data points~~; ~~and~~

simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~; and

determining a set of modal frequency and damping values based on all of the data sets.

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35. (Currently Amended) The system of Claim 34, wherein simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~ includes fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~ using a non-linear "N" damped sine wave fitting algorithm.

36. (Currently Amended) The system of Claim 34, wherein simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~ includes: ,

determining a fit error between a sine wave mode and the plurality of data points; and

applying a Fast-Fourier Transform function to the fit error to estimate a next sine wave mode to be included in the non-linear "N" damped sine wave fitting algorithm.

37. (Currently Amended) The system of Claim 34, wherein simultaneously fitting the number "N" of damped sine waves to the plurality of data sets ~~points~~ includes:

assessing a significance of a sine wave mode; and

determining whether to include the sine wave mode in the non-linear "N" damped sine wave fitting algorithm based on the assessment.

38. (Currently Amended) The system of Claim 34, wherein the plurality of test data sets ~~points~~ include a first plurality of test data points from a first test sensor, and wherein the computer module is further adapted to receive a second plurality of test data points from a second test sensor.

39. (Original) The system of Claim 34, wherein the computer includes a central processing unit and a memory component.

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40. (Original) The system of Claim 34, wherein the computer includes an I/O component.

41. (Original) The system of Claim 34, further comprising a data acquisition component operatively coupled to at least one of the computer and the control component.

42. (Original) The system of claim 41, wherein the data acquisition component includes a plurality of data acquisition sensors.

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